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"What can we reason, but from what we know."—Pope.

MONTHLY REVIEW

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EDITORIALS

EDITORIAL.

The following article is reprinted from the Rotarian Magazine and has been slightly altered to our needs by our very good friend Mr. Chas. Werft, of Cleveland. It is indeed a strange occurrence to find an article so exactly suitable for our guidance. The Cleveland Branch propose to read this at every meeting:

To All Members.

A terse suggestion to the member who would avail himself of the benefits to be derived from membershiip in the Society, as well as make his influence felt with his fellow member, is: Make your personality count. The man who assumes a retiring attitude and expects to be the passive recipient of benefits will receive only a small share of the publicity and impetus which may be his if he will but aggressively enter in the activities of the Branch.

Let him state his case with vigor; let him speak with freedom and without timidity, assured that each of his fellow members who are in earnest are doing likewise.

At the Society's very foundation are the ideas of mutual helpfulness and increased efficiency for its members. Any man's business, no matter what his line, will respond to publicity, and intelligent, forceful exploitation, and each member's acceptance of this fact is evidenced by his affiliation with the A. E. S.

Avail yourself of every opportunity offered to speak up; otherwise you miss your benefits. At the same time listen to the other man, that you may serve as well as he served.

SAME FACTS ABOUT WATER.

It covers about two-thirds of the earth's surface to an average depth of about 12,500 feet.

It forms 775 per cent of the human body.

When distilled to absolute purity it is almost a nonconductor of electricity.

In freezing its volume increases by one-eleventh that of the liquid.

READ AT THE CLEVELAND CONVENTION.

IMPROVING THE EFFICIENCY OF PLATING ROOM CIRCUITS.

By H. E. WILLMORE, JR.

(Tables referred to in this article will be published in next issue)

How much of the energy delivered to the shaft of the plating room generator is actually represented by the metal which is deposited in an hour or a day?

I might well hesitate in giving any figures because upon first thought you will be apt to accuse me of being insincere in my answer to this question. If you have an up-to-date plating room equipment and are very careful in the management of the electrical end of it, the answer may be 55 per cent., but to a very large percentage of platers the answer is as low as 10 per cent.

These figures may startle you, but I beseech you to take a lesson from the tale of the Widow Murphy. There had been an accident on the big building and two of Pat's comrades were dispatched with his remains to break the news to Mrs. Murphy. They rapped at the door and Mrs. Murphy opened it.

"Is this where the Widow Murphy lives?" asked Jerry.

"Shure, and this is where *Mrs.* Murphy lives, but I'll have yez to understand I am no widdy!"

"Oh! You're not, eh? Well, suppose jist you take wan look into this baskit."

There is more to be said. The limits of 55 per cent. and 10 per cent. represent the electro-chemical or energy efficiencies only. There are also hundreds of platers in the United States that have their electrical circuits so designed that they cannot hope to obtain a good day's output. In some cases the dynamo is too small and in others the tanks are not large enough. In still others these may be large enough, but the electrical connections are so poor and the conductors small and offering such a high resistance that the generator cannot possibly deliver its full rated output. These things have to do with what I would call "efficiency of design."

There is still another factor which has to do with the efficiency of operation. It is what the light and power companies term load factor. For example, one plater may so arrange his work that he is drawing an almost constant power from his generator all day, while another may load all of his tanks at one time and have them all empty at another. The latter runs his plating room with a poor load factor. His efficiency as an executive is low and he need only be mentioned here.

What I wish to talk about more particularly is the efficiency of design of the plating room circuits and to do so have divided the subject into four parts representing the plating bath, the tank conductors and rheostats, the main conductors or bus bars and the generator.

EFFICIENCY OF THE PLATING BATH.

The keynote to your last year's convention (as they say in politics) was, I believe, the standardization of plating. This agitation (also like politics) has seemed to have died out, and a great

many of you were willing that it should because you realized the complicity of the problem. This work will be carried out some day, however, along about the same lines as the investigation of plating with cobalt for which Messrs. Barrows, Kalmus, Harper and Savell deserve so much praise. When this work *is* done you will know more about the efficiency of plating solutions than probably any one at present can tell you. At the present time little or nothing can be done on paper to improve the efficiency of the plating bath except to point out to the plater some of the things which govern the efficiency.

The theoretically perfect solution is, of course, the one that obeys Faraday's law and to which there is no energy loss due to the resistance of the solution and no substances deposited other than the useful metal. All solutions, of course, fall short of the ideal. Just how they behave depends upon the nature of the solvent, the concentration, the temperature, the distance between anode and cathode, and the voltage applied.

We find by practice that it is advisable to sacrifice some of the points that would make for highest electrical efficiency in the plating bath in order to gain in the quality of deposit. Thus it is advisable to have a considerable distance between the anode and the cathode in order to have a smooth deposit; the deposit must be made rather slowly in order that it will be of the right structure and not discolored; we are willing that some other substances besides the copper, the nickel, the brass, etc., shall be deposited in order that the work may be kept clean and because of other advantages which can be gained. For example, there is a tendency toward the weakening of the solution about one electrode and a strengthening or concentration about the other due to the different speeds at which ions travel. Probably the best that can be said for the conducting salts is that they stir the solution and minimize this tendency. This is done at the expense of electrical energy, and there is undoubtedly a happy medium to be found, which does not permit too many nor too much additional agents. but at the same time permits a maximum speed, and give a good electro-chemical efficiency. This happy medium is what you will some day determine by experiment. For the present I hardly think we are very far wrong in relying on the experience of the most successful platers, but I would like to warn you when you are trying out some alleged new plating salt with a remarkable conductivity to investigate the amount of power used to deposit an ounce of metal.

Tank Conductors and Rheostats.

The design of tank conductors and rheostats is not involved with any unknown principles or laws and yet to the electrical engineer our methods of joining conductors, insulating bus-bars and operating rheostats seem to be far behind the other branches of the art of electro-plating. I have been in plating rooms where the conductors were decidedly under size, connections were corroded and poorly made, anode hooks were so hot they would burn your hand, the hooks touched the anodes at pratically only one point, and the rheostats were all set on some intermediate point with the resist-

ances veritable electric heaters with some of the coils at a glowing heat. Some of these things are due to inefficiency of design and some to inefficiency of operation. None make for nicety of operation.

It is common practice to use brass tubes across the tanks and to hang the work and anodes from these by wires and hooks, occasionally rubbing up the tubes with pumice to obtain good electrical contact. Brass tubing makes very good tank rods, because of its mechanical strength. The size of these tubes is often determined by the mechanical strength required, but for large tanks and those requiring heavy currents the electrical properties should be investigated. Good brass will carry 5-7 to 5-6 (or 71 to 83 per cent.) of the amount of current that a copper conductor of the same size will carry with the same loss in power.

For convenience in determining the size of tubing to use for tank "rods" I have prepared Table 1. The current carrying capacity of various sized tubes is given in amperes, and are based on an allowance of about one square inch of brass to 900 amperes. This corresponds to approximately .004 pounds per ampere foot, and a fairly close estimate of the cost of tubing can be obtained by multiplying the number of amperes by the length required times the cost per pound and the above figure by .004.

You will note that in Table 1 the lengths of the tubes have not been taken into consideration. These lengths are comparatively short and the current does not all flow the full length of the tubes but part goes to the first anode hook, some to the second, etc. In finding the size of brass tubing to be used it is well to choose a conductor large enough to carry its full share of the current. For example, if a tank will require 800 amperes and there are to be three anode carrying conductors and two cathode or work rods, the outside anode tubes should be large enough to carry each 200 amperes and the middle anode and the work tubes to carry 400 amperes. You would not want tubing smaller than one inch in diameter and in this case would choose two No. 12 gauge and three No. 8 gauge. It is just as well and perhaps better to order by giving the thickness of the wall in decimals of an inch. The table gives both.

The rods connecting the tank to the rheostat and the main bus-bars, except the branch rods which connect the tubes together at the bus-bar end of the tank, should be large enough to carry all of the current required by the tank. The method for choosing the size of these rods is the same as will be explained later for bus-bars. If the tank tubes have been figured closely it is well to "tie" the far end of these tubes together and for most cases ¼-inch rods will do. These last rods are only called upon to carry current when one side of the tank is more heavily loaded than the other, hence there is no need of their being very heavy except in special cases. Their use, however, makes for maximum efficiency.

I would like to comment upon our present methods of making connections, because here is a point where the plater in any number of factories is wasting power. I am not at all satisfied with many

of the connectors which will be found on the market at the present time, nor with the usual method of hanging anodes in the tanks. A good efficient connector consistent with the nicety to which plating solutions are made up and finishes produced should have the following properties: (1) The contact surface between the connector and the conductor should be greater than the cross-sectional area of the conductor; (2) The sectional area of the connector should be equal to or greater than that of the smaller conductor which it connects; (3) It should not loosen. If a connection heats more than the conductors it is a sure sign that the connection is bad and this should be remedied. It is possible, of course, to force current through a bad connection by raising the voltage, but if you do this you are wasting power and in some cases you find that the rheostat to this tank does not seem to operate the same each time you set it. Use threaded connectors wherever possible and if you cannot buy what you want make it in the shop. If you cannot get or make these, use split connectors and insist that they be of exactly the right size.

Anodes should not merely hang from their hooks. The hooks should be securely fastened into the anode. The present electrolytic anode is the very best practice. There is still a chance for considerable improvement in the contact between the hook and the tank conductors, however. There have been some attempts to improve this condition by some of the supply companies, but it seems to me that these have fallen short of the possibilities. It is desirable, of course, to have the anodes easily removable, for cleaning, but on the other hand, we should no longer permit the poor contact obtained between two cylindrical bodies with axis at right angles. The same is true of work racks. Here it seems to me are some possibilities which the supply men should not overlook: better connectors for bus-bars and tank conductors and better anode connections.

A word about the operation of rheostats. Do not set your generator rheostat on a high point and then attempt to cut down the voltage at all of the tanks. Generators are now built that do not require that the field shall be run at maximum strength to secure nearly constant voltage at the terminals. The generator rheostat can be made a power saver and the tank rheostats should be looked upon as necessary evils. Find the point on the generator rheostat that gives the voltage best suited to all of the tanks and requires the least use of the tank rheostats. Not only will this minimize the loss of power in the tank rheostats and the bus-bars, but there will be less fluctuation in voltage when an extra tank is placed in service or emptied, and a better quality of deposit. When it is found necessary to boost all of the tank voltages this can be done with the generator rheostat.

Efficiency of the Bus-Bars.

The problem of properly designing the bus-bars (the wall or generator conductors) is simply a question of choosing the conductors of economic size and sufficiently large to carry the current with only a permissible loss and still not so large as to be excessive

in first cost and interest and depreciation charges. The plater usually has a general idea of what he needs but very limited data with which to explain his wants. This too often results in the factory buyer attempting to reduce the cost by inducing the plater to do with smaller size rods. This in a great many cases results in false economy.

In laying out the bus-bars designer must consider the number of amperes required by each tank, the load factor of the tanks, the probable increase in the volume of work, and possible additions and changes in the equipment. Solid copper bars of either circular or rectangular section can be used. The round bars can be obtained in sizes varying by eighths from ¼ to 2 inches in diameter, while the rectangular bars can be had in almost any size, both dimensions varying by one-sixteenth of an inch. To obtain the most economical layout considering the first cost and the efficiency of operation the tanks requiring the heaviest current should be placed near the dynamo and the others arranged according to size. If consistent with the protection required by it the generator should be placed so that the shortest bus-bars will be needed.

As a guide in selecting the sizes of copper bars to use I have prepared Tables II and III. These tables give the sizes of round and rectangular bars and the current which they will carry 25, 40, 50 or 75 feet with a drop of one-half volt. In no case should the current for the various sizes of bars be greater than that indicated in the 25-foot column. The values given in this column are based on an allowance of 1,275 amperes per square inch, or about 0.003 pounds per ampere foot. The allowances in other columns are proportional.

The method of using the tables is as follows: We will assume that you have a 1,200-ampere generator and the first tank takes 400 amperes, the second 300, the third and fourth 200, etc. Measure the distance from the generator to the last tank to find the length of the bus-bars. If the conductors are not to run straight to the tank take this into account. Suppose the distance was found to be 48 feet. Then it would be well to select the bus-bars according to the column headed "50 ft." In my example the bar running from the generator as far as the first tank should carry 1,200 amperes and should be 1½ inches in diameter or a 1- by 2-inch rectangular rod. That part of the bus-bars running between the first and second tanks should be large enough to carry the total current required by all of the tanks except number one. It often occurs that the full-load current of the generator is only 70 to 80 per cent. of the total amperes required by all of the tanks. The dynamo may have been so chosen because all of the solutions would not be worked at one time. In such a case it may be found that the sum of the current required by all of the tanks except number one is greater than 1,200 amperes. In this case the 1½-inch rod should be run as far as the second tank. And thus it proceeds. The tables are so made up that when the bus-bars are carrying the full current the voltage at the last tank will be half a volt lower than at the generator. If the generator voltage is six, this will mean that the efficiency

of the bus-bars will be about 93 per cent. This figure can be made proportionately higher, but I believe that this is good practice considering the present price of copper and the consequent interest and depreciation charges.

You will not get this efficiency out of your installation, however, if the connections of the various parts are not well made. For supporting round bars I recommend the use of grooved porcelain insulators known to the electrical trade as "knobs." These are inexpensive and can be had in a number of sizes. The bars can be so arranged that the expansion and contraction and the vibration of the shop will have the least tendency to loosen the connections. For rectangular bars slotted pieces of wood which have been boiled in paraffine can be used. Brackets can be had for these bars but they are rather expensive.

Efficiency of the Generator.

Plating generators have a naturally low efficiency when compared to power generators for several good reasons. They are required to deliver very heavy current at low voltages. The speeds must be comparatively low. These things mean that the quantity of material used, especially copper, must be proportionately large, and this in turn means very heavy costs, which not all of the buyers are willing to pay. For these reasons it is probable that the efficiency of the best plating generator built is not above 80 per cent., and this is no fault of the manufacturer. On the other hand, it does not excuse the purchaser from selecting the best machine obtainable and, after it is bought, from treating it with all the respect due any nice piece of machinery.

I would select a compound wound interpole generator. It may even be better to specify that the generator shall be "over-compounded," which means that the voltage of the machine will increase somewhat with an increase in the current output. Plating dynamos will stand considerable over-compounding. This has a tendency to compensate for the increase in the voltage drop in the conductors.

A word about the care of the generator. It is not sufficient to buy a good generator, place it anywhere, and connect it with the source of power. If it is possible to do so, the generator should be placed in a cool, dry room by itself. It may be placed in the plating room, although there is no doubt but that the moisture and chemical laden fumes have some deteriorating effect upon it. Never place it in the polishing room or any other place where it will gather dust. Put the field rheostat in a convenient place, preferably near the instruments. See that the machine is in alignment with the motor or the driving shaft and choose your pulleys so that it runs at the speed specified by the manufacturer, if you want efficient operation and long life. Oil the bearings but do not flood them, and occasionally remove the old oil, replacing it at once with fresh lubricant. Do not allow the belt to slip when operating at normal load. See that the commutator is kept clean. A light oxidized color is not harmful if it has a lustre, but do not allow it to become a gummy, dull black. Wipe the commutator off with a piece of

dry, lintless rag at least once a day, but *do not use any engine or machine oil on it.* If it needs any lubricant use a very little good commutator compound or two or three drops of sperm oil on a cloth. Use abrasives sparingly. Usually a pine stick is all that is needed to clean the commutator of the little gummy spots that occasionally collect upon it. If you find it necessary to use sandpaper every month or so, permit nothing but the very finest grade. Never use emery cloth. In a word, if you want the highest efficiency from your generator, treat it with kindness—make a pet of it.

You may have noticed that all of my remarks concerned only the individual parts of the plating room circuit and included very little on the combined operation of these parts. This last is very largely an individual problem which each of you must solve to obtain the highest degree of efficiency and as a guide you should insist on an ammeter and a voltmeter. You alone know whether or not it is possible to lay out your class of work so as to improve the load factor,—whether or not you can fill some of the tanks and run them through the noon hour. These things fall under the jurisdiction of the foreman plater, as the manager of his department.

DISCUSSION.

Mr. Service: I move that a vote of thanks be extended to Mr. Willmore, Jr., for presenting this paper.

(Motion seconded and carried.)

Mr. Hogaboom: I would like to ask Mr. Willmore what is his opinion in the lay-out of a plating room in using the three-pull machine. I saw a plating room recently installed in which there were three generators. One was wound for two and four volts, another for three and six, and another for five and ten, and the tanks were arranged so those that required two volts were in that circuit, and those that required three were on the three and six, so that there was very little use for tank rheostats. The way that was brought about was that in trying to find a suitable rheostat, it was found necessary to design one that would cost $60.00, and it meant a large expenditure and loss of power. But by arranging these generators in the way I have told, a great amount of energy was saved, and the room was run quite efficiently. I don't know anything about it, and I would like to ask whether such a condition would be wise.

Mr. Willmore: I believe the scheme is a very good one. It all hinges on the question whether or not the same volt efficiency and shaft efficiency and power delivered to the generator, could be obtained. I should say the system is a very good one, and if they properly arrange those conductors—if it was expected that some of the tanks would be across both sides of the line, then considerable cost of copper could be saved in that middle conductor, too, thus also reducing the cost of it. Of course, there is also considerable power saved in the rheostats. It is an involved problem, and whether it actually was more efficient than the other way would have been, is something that would have to be determined in that plant by experiment, but it looks very good.

Member: Should the middle conductor be about one-third the

size of the other two?

Mr. Willmore: That is merely chosen because of the want of any better scheme of designing it. What is actually needed in that middle conductor in case you had two tanks, for example, one on one side and the other on the other, each taking 300 amperes, you would not need the middle conductor at all. If you had one tank taking 200 and the other 300, you would have to have a middle conductor capable of carrying 100, and that's the way it goes; and they sum it all up and say, the probabilities are, that the middle conductor will not be required to carry more than one-third the amount of the others.

Member: I would like to ask if there would not be some difficulty in maintaining a balance on such a system as Mr. Hogaboom has described. That is to say, would not one side of that machine be liable to be overloaded perhaps, or wouldn't there be some drawback to that scheme?

Mr. Willmore: As I understood, it should be three different machines. Of course, there is a possibility of overloading any one of them, because in taking almost the full output of one of these machines, on one branch, and besides that, across two outside wires, you might be taking a load that was added to that one load by one machine, but that is a question of designing it. If he chose the proper sized generator, he would eliminate the probabilities of such a thing happening.

Member: Suppose that the ampere-meters on the line would never go above the top of the machine, would that occur?

Mr. Willmore: If you had ampere-meters in each line, and watch them, to see that the current never went above each generator, then there is no harm done.

THE MESSAGE OF THE BUDDHA.

(From an Ancient Manuscript.)

"Hate is a cruel word. If men hate you, regard it not; and you can turn the hate of men to love and mercy and good will, and mercy is as large as all the heavens.

"And there is good enough for all. With good destroy the bad; with generous deeds make avarice ashamed; with truth make straight the crooked lines that error draws, for error is but truth distorted, gone astray.

"And pain will follow him who speaks or acts with evil thoughts, as does the wheel the foot of him who draws the cart.

"He is a greater man who conquers self than he who kills a thousand men in war.

"He is a noble man who is himself what he believes that other men should be.

"Return to him who does you wrong your purest love, and he will cease from doing wrong; for love will purify the heart of him who is beloved as truly as it purifies the heart of him who loves."

Rise early, work hard and late, live on what you can't sell, give nothing away, and if you don't die rich and go to the devil, you may sue us for damages.

READ AT THE CLEVELAND CONVENTION.

ALKALINE ZINC SOLUTIONS AND THEIR APPLICATION AND COMMERCIAL USES.

By C. H; PROCTOR, PAST SUPREME PRESIDENT

In presenting this paper for your consideration, this evening. I do so with the hope that the thoughts herewith present the experiments made and the data given may open up a field for experiment and research with Alkaline Zinc Solutions that may benefit every member of the A. E. P. Society and the commercial and industrial world at large, who have found it necessary in connection with their products to produce a coating upon iron and steel of a rust resisting nature that will insure a more protective coating to atmospheric influences upon the ferrous metals, which under the action of atmospheric agents are destroyed, but we cannot rid ourselves of these corroding agents because they are essential to human existence, to life itself. We know that air is indispensable to almost every living thing and more especially to human and animal life. The action of air produces oxidization and combustion; without this production of oxygen life in a very short time would become extinct because respiration would cease. So the great factor that produces oxidization or corrosion is essential to life itself, moisture is necessary, for the formation of clouds, that furnish the rain that produces the very sustenance that prolongs life.

In connection with the oxygen, the products of the soil produce the materials for oxidibation within the human body, the air produces the oxygen, that produces combustion, in other words to maintain the human machine in continuous operation, in connection with water (the mixture of hydrogen and oxygen) which is also essential to support human life. Moisture is the prime factor that produces oxidization or corrosion. It has been said that corrosion will not form unless an acid be present. We know that the acid that is most universally distributed throughout the universe is Carbonic Acid. The action of the air containing oxygen, in the presence of moisture, presumably hydrates the oxide. Carbonic Oxide is a by-product of the animal and vegetable kingdom, the exchange of Carbonic dioxide and oxygen, which is continually taking place between the animal and vegetable kingdom and the Carbonic acid of the air produces hydrated Carbonic Dioxide. In other words, the active factors of corrosion are the very necessary factors in the continuance and prolongation of human life So you see there is a very close relationship between the processes of living and rusting. Human life, as well as animal life, replaces the rusting or decaying of the tissues by the effect of oxidization, by moisture or food; but iron, the great factor in the modern world, cannot be regenerated in such a manner. We can only protect it from the very agencies that we know are essential to human existence.

It would lead too far to go into the theoretical cause of corrosion and oxidization and the galvanic action that is set up between metals of opposing polarity other than given. It is my intention only to deal with the subject of coating iron or steel products with zinc. Until the adoption of the electrolytic method, called electro-

galvanizing, the method of coating iron or steel with zinc used entirely was the hot or molten method termed "galvanizing." So galvanizing and electro-galvanizing are the terms used to distinguish the two methods from one another. Both of these methods are used upon an extensive scale and have developed into a very large important industry.

Although there are many materials and many methods in vogue for protecting iron and steel from corrosion, zinc, without a doubt, is the best protective coating for the metal. Both iron and zinc are electric positive metals, but zinc is more electro positive of the two. In other words, iron becomes electro negative to the zinc when the zinc is deposited upon the iron or steel. Any two dissimilar metals form a galvanic couple in the presence of atmospheric moisture. The result is, therefore, that with the slight galvanic action set up on galvanized or electro-galvanized iron or steel, a corrosion takes place of the zinc at the expense of the electro negative metal, iron. The effect is that the corrosion goes on with the zinc exclusively and iron is not corroded at all provided any zinc is left upon the iron or steel.

It has also been inferred that as the zinc produces hydrogen, due to the action of hydrated carbonic dioxide at the surface of the iron, oxygen cannot develop in its presence in sufficient quantities to produce corrosion. How far this theory is correct we are not in position to state on account of our limited knowledge upon the subject. However, that this theory looks feasible is proven by a matter that came to my notice two years ago. Surrounding the factory of the American Chain Company, Bridgeport, Conn., is a galvanized wire fence. About two years ago I was waiting near the employees' entrance for some time and began examining the wire fence. I located a section that the zinc had evidently peeled or stripped off. The weather had been unusually damp for some time. In other words, admirably adapted for rusting or corrosion. This section referred to was free from rust. A year later I examined this same section and during the latter part of March of the present year I again made an examination and found the uncoated section free from corrosion. This would explain the theory apparently that the hydrogen evolved prevents the formation of oxygen in the presence of zinc. It is an easy matter to prove this theory. Immerse a piece of iron or steel in water and it becomes coated with rust in a short time. Immerse a similar piece of iron or steel in water and at the same time immerse a piece of sheet zinc and the iron or steel will remain free from rust, due to the evolution of hydrogen. The application of molten zinc, or galvanizing, is probably the oldest method of rust proofing of iron or steel now in use.

The development of electro galvanizing only extends back to 20 years or so ago. Bower & Barff patented a method somewhere near the year of 1854 or thereabouts. I have not the exact date, which produced a black layer of magnetic oxide upon the surface of iron or steel and by the application of linseed oil after the finish was produced a splendid black finish was the result which is termed

the Bower-Barff or wrought iron finish. Several well known hardware manufacturers produce this finish upon an extensive scale. The method consists of heating the iron or steel articles to a temperature of 1,040 degrees F. in a closed retort and injecting superheated steam for four to six hours. After cooling the rust proof coating of magnetic iron oxide is produced; the application of boiled linseed oil completes the method.

There are many other methods of rust proofing that have been proposed during the past few years. Probably the best known is the Coslett Process, consisting of boiling the iron or steel parts in a solution of phosphoric acid and phosphate of iron in water. Several modifications of this process are in use at the present time; the Parker Process is one of the methods that have been exploited. Other modifications of the method proposed by Coselett are the addition of a highly concentrated solution of phosphate of zinc and phosphoric acid in boiling water, one part in 50 to 100 parts of water. The final coating of linseed oil is applied in all similar methods. Linseed oil alone gives a protective coating upon steel for a considerable length of time. The Bon Tempi and the Bradley processes are a modification of the Bower-Barff process. A hydrocarbon is injected at the same time as the superheated steam. This hydro carbon is usually in the form of gasoline.

Many pigment methods give a rust proof coating for certain periods, but zinc alone no doubt gives the best protective coating of all. Most platers are familiar with the sulphate solution. The basis of such solutions are zinc sulphate with the various additional agents such as aluminum sulphate, alum, sodium sulphate, sodium chloride, etc. The results have been highly satisfactory from such solutions. The only unfortunate feature is the occlusion of hydrogen in the deposit which produces a brittle and crystalline deposit that in many instances will not withstand the most important bending test, the application of high temperatures apparently separates the deposit from the base metal, proving that the deposit does not become imipregnated or alloyed with the iron or steel. The same is true with the galvanizinig or molten zinc application. Sherardizing is a method of vaporizing, of zinc fuming in a closed retort; zinc dust is used in the place of solid zinc for the purpose.

Recently it has developed that this zinc coating does not give an absolutely rust proof coating as the claims have been made for it. Whether the rust becomes deep seated or only superficial I am unable to state at this time. I have finally come to the alkaline method of coating. Of all the various deposits from sulphate solutions or molten metal method or Sherardizing, the deposit from the alkaline solution has proved itself superior. The deposit apparently becomes impregnated or alloyed with the steel and withstands the severest bending tests and can be hammered completely into the steel itself. Experiments made with temperatures up to 750 to 800 degrees F. have apparently no effect upon the deposit. The grain of the metal is closer, more adherent and less crystalline than any other deposit of a similar nature. Therefore, will withstand all of the usual tests with a smaller amount of metal deposited per square

foot of surface on account of the superior advantages, as noted.

Many experiments have been made with the alkaline solutions but a solution prepared upon the following basis has given the results noted upon the samples that I present before you. A careful examination will prove this assertion; the bending tests you can make to satisfy yourself. So far the solutions have been developed for zinc plating of steel; it is hoped that similar solutions may be developed for gray and malleable iron, but so far the very great evolution of hydrogen at the surface of the iron prevented absolute satisfactory deposit upon gray or malleable iron. Wrought iron can be plated as readily as steel. The solution proposed can be modified, the proportions increased or decreased according to conditions and the thickness of the deposit of zinc desired. The minimum amount of materials that can be used is as follows:

Water	1 gal.
Sodium Cyanide	1 5-6 ozs.
Zinc Cyanide	2 ozs.
Sodium Hydroxide	2 ozs.

Temperature of solution 110 to 120 degrees F. at from 2 to 6 volts, according to the surface load. A five-minute deposit upon steel after several months' exposure to atmospheric conditions from such a solution has given no sign of deterioration. For special and heavy deposits the solution may be composed as follows:

Water	1 gal.
Sodium Cyanide	3 1-3 ozs.
Zinc Cyanide	4 ozs.
Sodium Hydroxide	4 ozs.

Temperature and current conditions as previously noted.

In barrel plating the sodium hydroxide may be increased 25 per cent and the zinc cyanide and sodium cyanide, if found necessary. It is well known that caustic alkalies dissolve zinc very rapidly, forming zincate, so the prime factor in this solution is sodium hydroxide. The solution is very easily handled; is not self-sustaining, as claimed for some sulphate solutions. (No solution can be self-sustaining so long as decomposition occurs, but the alkaline solution is as nearly so as possible.)

The alkaline zinc solution has many distinct advantages over the sulphate solutions and briefly mentioned they are as follows:

1st.—Superior cleansing properties. The sodium hydroxide acts as a cleanser by the evolution of hydrogen in excess before the decomposition of zinc takes place.

2nd.—Superior conducting properties. Sheet steel cones, 12 inches deep with openings of 6 inches and 9 inches, respectively, have been plated uniformly inside and out in five minutes and have withstood the bending and heat tests previously noted. Steel has also been plated and corrugated afterwards, as shown by the samples.

3rd.—Rapidity of deposit due to a 25 to 50 per cent. increase of amperage.

4th.—Method valuable in coating all steel products where a rust proof coating is desired previous to copper, brass or nickel plating.

5th.—In mechanical and continuous plating such as finishing barrel hoops, iron and steel strips in coils, wire, etc., woven wire for mattress springs, steel wire netting, automobile rims and hundreds of other articles.

The alkaline solution, owing to its superior cleansing properties, rapidity of deposit, uniform, ductile, adherent and non-crystalline deposit, will eventually supersede the acid solutions of every description and combinations.

In any event the method is worthy of your consideration and we feel sure will find a place in your plating department and will prove of unusual advantage in efficiency and economy; the two important factors upon which the future development of the plating industry depends.

NOTICE.

We wish to call special attention to the following letter from Mr. Voss of the New York Branch. It is of great interest to all.

Dear Mr. Richards:

A few months ago I was appointed chairman of the Laboratory Committee of the New York branch. My connection with the Society from the very beginning has given me an opportunity to notice certain conditions.

Upon my appointment as chairman of the Laboratory Committee I decided to try and overcome some of these conditions.

I decided to have an interchange of articles between a few of the branches; then publish the results of the various discussions in the Review. This experiment is working out so well that I would like to make this movement general, taking in all branches. By this method all branches will share in the benefits of articles that do not find their way into the Review.

Another movement I have started is to formulate a set of questions, send them to every branch, have them discuss them, send their verdict to the New York branch. We will tabulate them and publish results in the Review. We will send a set of these questions out every two months, if possible to do so. If any member has trouble of any kind tell us your trouble (by us I mean New York Laboratory Committee). We will take the matter up and do all we can to help every member.

Mr. John Sterling, who is secretary to the Laboratory Committee of the New York branch, will send you a list of questions, or the questions can be published in the Review. All correspondence should be sent to Mr. Sterling.

I would like to see the National or Supreme body offer a prize of $5.00 or $10.00 for the best article published in the Review every three months. The article to be of practical value to the foreman plater. Each branch voting upon the articles and sending their verdict to the Supreme body, who will publish the votes cast in each branch for the winner.

So don't forget we are here to help every member of every branch and will work with the assistance of every laboratory committee of the A. E, S.

Respectfully yours,

WM. VOSS,

Chairman of New York Laboratory Committee.

WHAT THE BRANCHES ARE DOING

CHICAGO.

Meets fourth Saturday of each month, 8 p. m., Western Building, Randolph Street and Michigan Avenue. Secretary, Oscar E. Servis, 5305 Warner Ave.

"HEAR YE" "HEAR YE."

That the Annual Round up and "SMOKER" of the "CHICAGO BRANCH" A. E. S. will be held at the HOTEL MORRISON, Saturday Evening, September 23rd, 1916, at 7:30 P. M.

Music, Entertainment, Refreshments and Smokes Free.

The committee also expects to have something of Educational value to present and invite all members to participate with papers or talks on "PLATING."

A short session of our regular meeting will be held before the smoker.

Applicants for membership will also be admitted.

"DON'T FORGET THE DATE."

The above notice to the members of Chicago Branch was but another call to the faithful. Seventy-one members turned out for this event which has become an annual feature of great importanc.

The smoker easily surpassed any former one of its kind, and those members who were absent certainly missed a rare treat.

For the educational part of the program a paper was read by Mr. F. J. Liscomb upon "More About Pitting," which was very well received. Some descriptive formulas were presented by Mr. M. W. Baldwin, which were also very much appreciated.

OXIDIZING ALUMINUM—PLATING ALUMINUM.

After disposal of the business routine, the meeting was turned over to Mr. E. Lamoureaux, Chairman of the Committee of Arrangements, who, after announcing the outline of the program, read letters from our esteemed Supreme President, Mr. H. H. Williams, and the Editor-in-Chief, Mr. H. J. Richards, which are printed in connection with this report. Then a recess was declared.

Upon reopening of the meeting Mr. Lamoureux called upon Mr. O. E. Servis, Supreme Second Vice-President, to preside, and the following program was presented. Our esteemed Commodore and Editor sent a letter of cheer and poetic wit, which caused considerable merriment among those present, and read as follows:

FROM THE EDITOR.

To the Chairman of Chicago Branch Smoker, Greeting:

May your shadow never grow less.
May your fun tonight be fast and furious.
May you truly have a feast of reason and a flow of soul.
Therefore, brothers, prefer not the eats, to the intellectual.

Consider the bird called the Pelican, which has a one molecule brain, of which the poet says:

Oh, a wondrous bird is the Pelican,
His beak holds more than his Belican.

He stores in his beak
Food enough for a week,
And I can't understand how the Helican.

Still in these days with everything going up it behooves us occasionally to put something down. This morning in pondering over the continual ascension of values, the spirit of Longfellow descended on me and I perpetrated the following:

Tell me not in mournful numbers
There's no emery in the land
And that in the nearest future
Polishers will work with sand.

Tell me not that felt and canvas
Soon will cost too much to use,
And that factories are making
Polishing wheels from old shoes.

Tell me not that buffs of all kinds
Cost so many blooming rocks
That we simply cannot buy them
And we'll use old shirts and socks.

Tell me not the price of nickel
Has gone up a hundred fold,
And that ninety per cent anodes
Will be worth their weight in gold.

Tell me not that ink and paper
Have gone nearly out of reach,
And that A. E. S. Reviews
Soon will be worth eleven dollars each.

Let us then be up and doing,
Keeping strictly up to date
With our plating education,
Learn to labor and to wait.

Our worthy Supreme President, sent a very nice letter of encouragement which was much appreciated and read as follows:
To the Members and Friends of Chicago Branch:

American Electro Platers' Society assembled for an evening of good fellowship, and to further the welfare of our society, it affords me much pleasure to send a message of good wishes for a successful and happy affair. I certainly look to Chicago Branch, with my several personal acquaintances among its members, to attain to a higher degree of "Servis" this present year. It can be done and Chicago has the members who will declare "I will."

Sincerely yours,
H. H. WILLIAMS,
President Supreme Society.

Mr. Fischer, who favored us with selections at the piano, during the recess and between program numbers, is deserving of spe-

cial mention, and the Leland "Comedy Four," did themselves proud and three selections were thoroughly enjoyed.

A special feature of the evening was the singing of popular and patriotic songs by the entire membership, assisted by the quartette. This feature developed another characteristic of the Chicago Branch members, and that was the quality of the voices. The tone and sweetness would have done credit anywhre and leads us to the conclusion that managers of note, who are constantly looking for high class artists and material in this line, have been missing a grand opportunity. Besides we are forced to another conclusion which has great possibilities. In view of the great number of highly developed voices heard around the tables, is it possible that cyanide fumes, acid and other odors from the plating room are of great value to voice culture. If our impression is correct we fear that Caruso, Tita Ruffo, McCormack and other singing celebrities had better look to their laurels.

Another incident of note brought out was the capabilities of our esteemed Second Vice-President, O. E. Servis, as a choral leader. Campanini in his best days never had anything on him.

During the presentation of the various features outlined in the program, and interspersed with recess at two intervals, a buffet luncheon was served, and with the inner man satisfied it follows that the outer one is willing to let joy hold sway unrestrained.

Messages and letters were read from Past Supreme President, Mr. J. H. Hansjosten, and Past Editor-in-Chief, Mr. H. E. Willmore, and others, expressing great regret at their inability to be present.

Much satisfaction was displayed by so many out-of-town members being present.

Committee was composed of the following members: E. Lamoureux, J. H. Hall, M. W. Baldwin, H. Posbeck, M. Herman.

PLATING ALUMINUM.

By M. W. Baldwin.

(Presented at the Chicago Smoker.)

Immerse metal in boiling hot potash, then wash with lime water and dip into a 2 per cent bath of potassium cyanide for a few minutes. It is then immersed in a bath of hydrochloric acid containing one grain of iron per litre. It is then nickle plated in the usual manner. The plating adheres perfectly. The deposit has a white, matty appearance which becomes brighter when scratched and burnished.

When hammered or bent, the deposit will not crack and the metal can be heated to the melting point of aluminum without separation of the nickel.

Oxidizing Aluminum.

Immerse the metal in boiling hot potash a few moments to obtain a matty appearance, then wash off in cold water, then immerse in a solution of 1 gallon muriatic acid; ½ gallon sulphuric acid, 1 pound arsenic, 1 ounce potassium sulphuret, 1 pound carbonate of iron.

Watch very closely as the solution attacks the metal very

quickly and if allowed to remain too long in the solution, has a rough and burnt appearance. If handled carefully, comes out a nice black. The work is then allowed to remain in running water for a short while, then immersed in a solution of one-half yound soda and one gallon water, for a few minutes, then in hot water and dried off in sawdust.

NEW YORK.

Meets second and fourth Friday each month. Secretary, Wm. Fischer, 300 St. Anns Ave.

The meetings of the New York Branch are well attended as the members are much interested in the work of the Laboratory Committee. The committee is sending letters to other branches asking for formulas of solutions. When they are received, the members discuss the chemicals that are in these formulas and try to improve on them by practical test. The results will be communicated to the branch from which it came.

The New York Branch request that this be published in full in the Monthly Review, so that the branches receiving these communications will understand the whys and wherefors and give them their earnest consideration, as we believe it will benefit every member of the A. E. S.

TORONTO.

Meets fourth Tuesday of each month at Occident Hall. Bathurst and Queen Streets. Secretary, Ernest Coles, P. O. Box 5, Coleman P. O., Toronto, Ont.

The regular meeting of Toronto Branch was held on Thursday, Sept. 28th, with President Salmon presiding over a good attendance. After routine business had been disposed of Mr. Roy Williams and Mr. Baker, of the J. B. Ford Co. (Wyandotte), spoke briefly. A request from the director of the Bureau of Education, Mr. Geo. B. Hogaboom, to elect a representative from Toronton Branch, resulted in the unanimous choice of Mr. W. S. Barrows. A paper on nickel plating plumbers' supplies, by Mr. J. A. Magill, was listened to with great interest, and enjoyed by all present. The subject sounds simple, as the reader remarked, but the quality of Mr. Magill's work is well known to the members of Toronto Branch. The questions asked in reference to the paper lead to a discussion on the old-timer, "Pitting," which was as usual discussed heartily. Announcement was made during the evening of the departure over seas of one of, if not the most, popular members of Toronto Branch, W. W. Wells, Jr., to join the "Flying Corps." Billy always was on top, so that explains his choice. His popularity was in evidence at the convention where it kept Mr. Barrows busy explaining his absence. Everybody's pulling for Bill.

The additional assessment of 25 cents per quarter for one year announced in the report of the August meeting was for the purpose of creating a library fund, which was not stated in the Review.

ST. LOUIS.

Meets third Saturday of each month at Public Library Assembly Rooms. Secretary, F. C. Rushton, 4405 Blair Avenue, St. Louis, Mo.

The September meeting of the St. Louis Branch was held at the St. Louis Public Library.

A letter was read from Mr. Heil, Wichita, Kan., saying that he would like to get samples of nickel solution for various members, with formulas of same, and any data that might be interesting and that he would analize for metal content, measure resistance, etc., the results to be made up in chart form and presented at the 1917 convention. The members were enthusiastic over the idea, appreciating the fact that Mr. Heil would be undertaking quite a task.

Mr. Musick read a very interesting paper on metal cleaning.

At ten o'clock the meeting adjourned to the sidewalk for further discussion of platers' troubles.

DAYTON.

Meets first Wednesday of each month at the Y. M. C. A., Dayton, Ohio, Secretary, Alphonz Lamoureux, 432 E. Second St.

Our October meeting, which was largely attended, proved very interesting from the fact that we had one of the largest attendances of recent months.

A letter from Director Hogaboom of the Bureau of Education of A. E. S., was read and after considerable discussion on same Mr. H. M. Williams, chemist of the N. G. R., was elected a member of the board to represent Dayton Branch.

Upon word from secretary of New York Branch on the reinstatement of Mr. B. Barrows, forman plater of the Dayton Metal Products Co., he was elected a member of our branch. After disposing of the other regular business of the evening our librarian, Mr. Van Derau, read a grand paper on Hot Copper Plating, which was well received and brought forth some very good points. His paper will be sent later for publication.

MILWAUKEE.

Meets first Friday of each month at West Side Bank Building, Third and Chestnut Streets. Secretary, E. C. Yaeger, 962 Ninth Street, Milwaukee, Wis.

At our last meeting the members were hard at work starting something up for the near future. We have decided to start our chemical class again, of which all the members present were very enthusiastic over the results we received from our former classes. Everyone present pledged themselves to be a member of the class and I will assure you that we will derive a great benefit from this course. Our Prof. Arthur E. Kuntz, an honorable member from our Branch will continue to be our instructor.

This insures success for the new class, as we know he will make it very interesting for us in our new class.

CINCINNATI.

Meets on the first Friday of each month at 218 East Second Street. Secretary, F. H. Nordmann, 720 Froom Avenue, Cincinnati, Ohio.

Our regular meeting was called to order by President H. Baum. All members are very enthusiastic regarding our laboratory. We have every reason to believe it will be equipped very shortly and in running order. Mr. Sheckel has promised us a practical demonstration of his nickel plating and etching at one operation.

DETROIT.

Meets first Tuesday of each month at 26 East Congress Street. Secretary, B. E. Miller, 543 Townsend Avenue, Detroit, Mich.

The regular meetings of Detroit Branch has been changed tc the first Friday of each month.

The regular meeting of Oct. 6th was called to order with President Brockway in the chair with a large number of members being present. The growth of this branch was again in evidence, two applications for membership were presented. Mr. Woodmansee and Geo. Kutzen were appointed as a committee to act with Geo. Hogaboom on the Bureau of Education which was established at the Cleveland convention. The questions came up in regards to pickeling pressed brass castings which one of our members is having a great deal of trouble in getting results. Several suggestions were given, the use of an electro pickel using one pint sulphuric acid to one gallon of water, using a direct current, another the use of hydroflouric acid, or sand blast, in a tumbling barrel, and then dip into nitric acid before bright dipping. A. P. Brockway, having charge of the department of pickeling of steel at the Ford Motor Car Co., was asked to read a paper on that subject, which he said he would be glad to do at our next regular meeting.

The Board of Education has established a fund sufficient to install a plating plant at the Cass Tech. High School, and a large class of platers has been formed which are receiving instructions in electro-chemistry every Tuesday evening.

CLEVELAND.

The Cleveland Branch meets every second and last Saturday of the month at 1344 East Prospect Street.

Secretary, Charles Werft, 1775 East Sixty-eighth St. Cleaveland.

The last meeting of Cleveland Branch was very well attended. Since the laboratory has been established our attendance has gone up wonderfully.

Mr. Ter Doest was appointed to act as the Cleveland representative on the Board of Education.

PHILADELPHIA.

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Streets Secretary, Philip Uhl, 2432 North 29th Street, Philadelphia.

The regular monthly meeting was held October 6th, with Presi-

dent Bell presiding and a good attendance. A committee was appointed to arrange for lectures for the winter months.

A general discussion was held on the best method of nickel plating on tin, which will be continued at the November meeting.

We would like to have the following question answered: How can a black finish be put on cast iron that will stand considerable amount of heat? This is a black finish on stove work and is wanted by one of our members.

BRIDGEPORT.

Meets third Friday of each month at the office of the Brass World, 260 John Street, Bridgeport, Conn. Secretary, Nelson Barnard, 858 Howard Ave., Bridgeport, Conn.

We had a very fine meeting on the 15th of this month and hope to see some good work come from it that will be of a benefit to you and the Review. We had seven questions sent to us by the New York Branch and we are going to exchange views on the same and in time give the results over to the Review for publication. We had a very fine time at our outing last August and are planning to give about four smokers this winter at our rooms to better our membership list.

TOLEDO.

Meets the last Tuesday of each month at Toledo University. Secretary, James E. Nagle, 209 Navarre Ave., Toledo, Ohio.

Now that the vacation season is over we will be able to hol l regular meetings again.

The last meeting was held at the Toledo University on Tuesday, Sept. 26th, with President H. L. Myers in the chair. The attendance was very good. The new members are going to take up the regular course in chemistry at the University and those of us who attended last year are going to take up where we left off in the spring.

A commmunication from Mr. Hogaboom in reference to the Educational Bureau, received and it was the sense of this branch that the bureau should be conducted along the lines as set forth by Mr. Hogaboom in his paper read at the Cleveland convention.

We elected President H. L. Myers as the local representative of the bureau.

It was decided to meet every two weeks, on Tuesdays, the second and fourth.

PROVIDENCE.

Meets second and fourth Wednesday of each month at No. 60 Weybosset Street. Secretary, Albert J. Lemrise, 124 Waverly Street, Providence, R. I.

INDIANAPOLIS.

Indianapolis Branch meets second Saturday in month at Hotel Denison. Secretary, L. Mertz, 1725 Union Street.

ROCHESTER.

Meets second and fourth Friday of each month at University of Rochester. Secretary, C. V. Haring, 603 Dewey Avenue, Rochester, N. Y.

NEWARK.

Meets first and third Friday of each month, 8 p. m., 47 Bank Street, Newark, N. J. Secretary, Geo. Reuter, Jr., 333 S. 19th Street, Newark, N. J.

APPLICATIONS FOR MEMBERSHIP.

MILWAUKEE BRANCH.

Frank J. Marc ..... 1423 Cherry St., Milwaukee

DETROIT BRANCH.

J. H. Flanagan ..... 294 Third St., Detroit
Chas. M. Philips ..... 316 Rohns Ave., Detroit

CHICAGO BRANCH.

Wm. Dorrath ..... 2445 N. Central Park Ave., Chicago
E. W. Hilliard ..... 2044 Bradley Place, Chicago
E. W. Randall ..... Chicago

PHILADELPHIA BRANCH.

J. H. Wiley ..... Henry Diston Co., Philadelphia

TORONTO BRANCH.

Chas. Kemish ..... 241 Boston Ave., Toronto, Ont.

ELECTED TO MEMBERSHIP.

TORONTO BRANCH.

H. J. Harrison ..... 245 Bellwoods Ave., Toronto, Ont.

PHILADELPHIA BRANCH.

A. E. Shugard ..... 1013 E. Palmer St., Philadelphia

CHICAGO BRANCH.

Ray M. Goodsell ..... Muskegon Plating Co., Muskegon, Mich.

DAYTON BRANCH.

C. S. Seely ..... 17 Burns Ave., Dayton

CLEVELAND BRANCH.

Chas. J. Smith ..... 121 St. Clair St. N. E., Cleveland
Wm. H. Schultz ..... 1779 E. Forty-fifth St., Cleveland
Nathan Hartman ..... 307 Beaumont St., Cleveland
Robert H. Haspe ..... 9920 Cleveland Ave., Cleveland
T. S. Hammer ..... 2074 E. 102nd St., Cleveland
A. J. Thomas ..... 3207 W. Ninety-seventh St., Cleveland
Harry Ochs ..... 18377 W. Forty-seventh St., Cleveland
W. W. Linfoot ..... 91 Benedict Ave., Norwalk, O.
Wm. V. Crater ..... 341 Prospect Ave., Canton, O.

CHANGE OF ADDRESS.

H. H. Cresswell, Jr. ..... Apartment 25, 225 Gladstone Ave., Toronto
M. Salmon ..... 104 Lake Front, New Beach, Toronto, Ont.
Oscar E. Eervis ..... 5305 Warner Ave., Chicago, Ill.
F. J. Hanlon ..... 5254 Cullum Ave., Chicago, Ill.
A. Lamoureux ..... 432 E. Second St., Dayton, O.
G. D. Holdom ..... 726 DeQuincy Ave., Indianapolis, Ind.

TRANSFERRED FROM CLEVELAND TO BRIDGPORT.

Thomas J. Kane ..... 144 Baldwin St., Waterbury, Conn.

Resigned: F. R. Ahlstrand, of Philadelphia.

Suspended: O. E. Easton of Cleveland.